AAR Significant Activities Report
September 27, 2002

SAFETY R&D

Taxiway Centerline Deviation Study: Ryan King (AAR-411) participated in a meeting of the International Industry Working Group (IIWG) at FAA Headquarters in Washington, DC. The IIWG is a conglomerate of international airport authorities focused on meeting the challenges of the soon to be introduced Airbus A380 New Large Aircraft. The two-day meeting provided the opportunity for the international airport community to share ideas and present their similar taxiway deviation data collection projects. King briefed the IIWG members on the status of the FAA's Taxiway Centerline Deviation data collection efforts at JFK and Anchorage International Airports. Phase II of the JFK International Airport Taxiway Deviation data collection effort is scheduled to commence in October 2002.

In-Pavement LED Strips: On September 17, Visual Guidance personnel from AAR-411 traveled to Eppley Field, Omaha, NE, to conduct day and nighttime evaluation of in-pavement LED strips that were recently installed on Taxiway Charlie. The in-pavement LED strips are being evaluated as an enhancement to traditional painted markings. AAR-411 previously installed a similar LED system here at the Technical Center, on the FAA Ramp. The evaluation was conducted at the request of AND-520.

FAA Center of Excellence for Airport Technology: On September 19, Dr. David R. Brill, Dr. Gordon F. Hayhoe, and Mr. Wayne Marsey of the Airport Technology R&D Branch (AAR-410) attended a review meeting of the FAA Center of Excellence (COE) for Airport Technology at the University of Illinois Urbana-Champaign (UIUC). The meeting was held at UIUC's ATREL laboratory facilities located in Rantoul, Illinois. Presentations were given by project principal investigators and graduate students on current COE projects in the airport pavement area, including: analysis of data from the FAA's National Airport Pavement Test Facility (NAPTF) and Denver International Airport instrumented runway, fatigue studies on airport concrete slabs, evaluation of flexible pavement overlay design procedures, and rutting evaluation studies on granular subbase materials. Plans for continued and future projects were also discussed. A successful summer internship program for HBCU students, designed to encourage enrollment of underrepresented minorities in graduate civil engineering studies, was continued in 2002.

6th Joint FAA/DoD/NASA Aging Aircraft Conference: Several members of AAR-400 participated in the 6th Joint FAA/DoD/NASA Aging Aircraft Conference sponsored this year by the FAA. The conference, held this year in San Francisco, CA, included nearly 100 technical papers, 30 posters, 51 exhibitors, and for the first time, four issue-focused panels. Conference activities also included a

tribute to the late Dr. Jack Lincoln, award of the Administrator's Extraordinary Service Award to the Technical Oversight Committee on Aging Aircraft, and tours of United Airlines' Maintenance Facilities and Raychem's Wire Manufacturing Plant. Speaking at the plenary session, Mr. Nick Sabatini (AVR-1), emphasized the need for continued efforts to mitigate the threat of age-related aircraft failure and identified several major aging aircraft rulemaking initiatives. The conference technical sessions were organized into three tracks, Structures, Systems, and Fleet Management. Preliminary proceedings are available from the conference organizer AgingAircraft2002@GalaxyScientific.com. Updates (late submissions) and final proceeding to be made available on the website http://www.galaxyscientific.com/agingaircraft2002.

Implementation and Use of the FAA National Wildlife Strike Database: On September 16, Dr. Michel Hovan from the Airport Technology R&D Branch (AAR-411) and Ed Cleary from the Airport Safety & Certification Office (AAS-300) made a joint presentation at the Annual Airport Certification Inspectors Recurrent Training held in Salt Lake City, UT. They demonstrated how airports could use the FAA National Wildlife Strike database as the primary internet-based tool to report wildlife strikes. They also discussed how airport personnel and airport certification inspectors can now use special querying tools to access the database online and use the data to help them quantify and analyze bird strikes at their airports. As a side note, a total of 165 bird strikes have already been reported online in the first half of September, of which 16 have resulted in some level of damage to the aircraft. For more information, please visit the FAA primary wildlife mitigation strike R&D site at http://wildlife-mitigation.tc.faa.gov or contact Michel Hovan at (609) 485-5552.

Analysis of Accident Fuel Spillage Based on Fire Damage: The National Transportation Safety Board (NTSB) recently published the fatal accident report for a Jetstream 3101 that crashed near Wilkes-Barre, PA, concluding that the probable cause of the accident was fuel starvation. The report contains an analysis of the fuel quantity on board, based on the extent of fire damage, by a consultant engaged by the airline. It was concluded by the consultant that a significant quantity of fuel was spilled and burned upon impact. Dave Blake (AAR-440) reviewed the report. Portions of Dave's rebuttal of the consultant's findings are contained in the report, including the following statement, "by ignoring the contribution of burning cabin materials and other fuel sources, the quantity of fuel estimated to produce all of the thermal damage is greatly overestimated."

Journal Paper on Fire Resistant Polymer Thermal Degradation Published: The referred *Journal of Polymer Degradation and Stability* (78(1), 73-81 (2002) recently published "Thermal Decomposition of Cyanate Ester Resins," co-authored by Rich Lyon (AAR-440). Polycyanurate networks were prepared by thermal polymerization of cyanate ester monomers containing two or more cyanate ester (O-CN) functional groups. The thermal decomposition chemistry of nine different polycyanurates was studied by thermogravimetry and infrared analysis of solid films and analysis of the gases evolved during pyrolysis using infrared spectroscopy and gas chromatography-mass spectrometry. It was found that the thermal stability of the polycyanurates was essentially independent of monomer chemical structure with the major mass loss occurring at about 450C for all materials. Analysis of the solid-state and gas phase thermal degradation chemistry indicates a thermal decomposition mechanism for polycyanurates which begins with hydrocarbon chain scission and cross linking at temperatures between 400-450C with negligible mass loss followed by decyclization of the triazine ring at 450C which liberates volatile cyanate-ester decomposition products. The solid residue after pyrolysis increases with the aromatic content of the polymer and incorporates about two thirds of the nitrogen and oxygen present in the original material.

HUMAN FACTORS R&D

Electronic Flight Bag (EFB): On September 10, 2002, Divya Chandra (Volpe Center) presented an update on EFB human factors considerations to a meeting of the Air Transport Association Digital Data Working Group in Atlanta, GA. The updated draft document was provided to the group, and comments will be reviewed by teleconference later in September. Material from the July 2002 EFB Advisory Circular was incorporated into the latest draft, and the chapter on Electronic Charts was fleshed out. The results of a formal issues and requirements analysis were also incorporated into the Electronic Charts chapter. The Volpe document is cited as a reference in the draft Advisory Circular on EFBs.

Human Performance: Dr. Thomas Nesthus (CAMI) traveled to Memphis, TN, to assist the National Transportation Safety Board's Human Performance Group with investigation of the crash of FedEx Flt 1478 in Tallahassee, FL. The performance group attended the FedEx Boeing 727 Second Officer's Human Factors/CRM courses that included topics on crew resource management, situation awareness, CFIT risk assessment, decision-making, sleep and fatigue for back-side-of-the-clock operations, and flight deck distractions. Interviews were held with key FedEx flight training instructors and management and a visit was made to the Aircrew Operations Center for familiarization with the sleeping and flight preparations facilities. Follow-on investigation activities for the performance group are pending direction from other NTSB groups.

Employee Selection: Dr. Dana Broach (CAMI) participated in an Aircraft Certification (AIR) workgroup September 4-5, 2002 at the Team Technology Center in Washington, DC. The purpose of the workgroup is to define a new supervisor selection process for AIR. Dr. Broach provided a tutorial on the Uniform Guidelines on Employee Selection Procedures (29 CFR 1607). He also provided an overview of the relevant professional standards and principles for the development and use of employee selection procedures. Following this presentation, the workgroup recommended that AIR conduct a selection-oriented job/task analysis of the target 75 supervisory positions in AIR as the first step in developing a new selection system.

SECURITY R&D

Silicon Valley Blue Ribbon Task Force: Walter Wall, Buzz Cerino, and Rick Lazarick (AAR-510) participated in a series of meetings with members of the Silicon Valley Blue Ribbon Task Force. The staff arranged the meetings for Congressman Mike Honda, and the local staff participated in all of the activities. The primary focus of the meetings was to exchange ideas predominantly in the technology areas of access control (including biometrics) and advanced secure integrated network communications. There were several opportunities for local corporations to present technologies that have potential applicability to transportation security. The final meeting was open to all Blue Ribbon Task Force members and focused on making progress on the Task Force proposal to use San Jose International Airport as a pilot site for demonstrating the advanced secure network technologies. Follow-up activity should be expected as the Task Force reaches out to Transportation Security Administration (TSA) management for support.

Airport Access Control Pilot Program (AACPP): Rick Lazarick and Vollie Fields (AAR-510) participated in the contract kickoff meeting with Mitretek Systems. Mitretek is a non-profit corporation that provides technical services to the U.S. Government only. It is the lead support contractor for the FBI Integrated Automated Fingerprint Identification System. Its role in the AACPP is to provide technical support to the Program Manger and to conduct technology and equipment evaluations prior to deployment in the airports for operational evaluation.

Maritime Security Exposition: Skip Lane (AAR-510), Mike Versage (AAR-510) and Paul Jankowski (AAR-510) attended the U.S. Maritime Security Expo at the Jacob Javits Convention Center in New York on September 18 and 19. Approximately 90 domestic and international exhibitors from the security industry were present. Security domains included access and perimeter control, biometrics, canine, chem-bio detection, engineering, entry and smart cards, information and communications, intelligence reports and systems, locks and seals, optics imaging and video, publication alerts and news, risk mitigation, sensor fusion, shipping, spectrometry, system integration, training, vessel and cargo tracking and control, vulnerability analysis services, and x-ray/gamma-ray inspection. It is recommended that the TSA consider sponsoring a booth at future Maritime Security conferences.

International Civil Aviation Organization (ICAO): The Transportation Security Laboratory (TSL) hosted a luncheon for 11 ICAO commissioners representing 11 countries on September 24. The delegates are gathering data while commenting on international standards and recommended practices. These recommendations, known as "Annexes to the Convention on International Civil Aviation," influence aviation's future on a global scale. Michael Versage (AAR-510) presented aviation safety and security videos. After a high-level briefing by TSL Director Ken Hacker (AAR-500), the VIPs toured the Trace Lab where Chan Heng (GST) and Sheldon Brunk, Ph.D., (AAR-520) gave demonstrations. Roy Mason (AAR-530) gave demonstrations on equipment in the Bulk Lab and Howard Fleisher (AAR-530) reviewed progress and challenges in the Aircraft Hardening Program. The videos, briefings, and tours were well received and provided needed information about aviation security technologies currently in development or planned for the future.

National Safe Skies Alliance/Oak Ridge National Laboratories (ORNL): A meeting was held on August 27 with Regina Ferrell from ORNL to discuss ORNL's work on Operator Assist Technology (OAT). ORNL's approach compares regions of an x-ray scanned image to stored images from a database. Those images highlight regions that match potential threat images through the identification of specific characteristics (i.e., shape and grayscale). Possible plans are to collaborate efforts with ORNL to further develop OAT.

Government of the Netherlands: On August 26, AAR-510 met with TNO Prins Mauritis Laboratory, the Netherlands' government-owned research and development facility, to brief them on the most current work with Threat Image Projection (TIP). Topics covered were new requirements for second-generation TIP systems, the TIP network system, and the new TIP library. Also discussed was the TIP Optimization Study being conducted at Seattle-Tacoma International Airport.

First Research Institute (FRI) of China: Meetings were held at the FRI in Beijing, China, on September 9 and 10, to discuss TIP. This meeting allowed AAR-510 to explain in detail some of the functional requirements not understood by the FRI. This was also an opportunity to meet with a

vendor to discuss the new specifications established in the "Functional Requirements for Second-Generation TIP Systems." Lok Koo (AAR-500) was instrumental in translating this presentation of TIP concepts and process for the researchers from the FRI. Shiu Cheung, Ph.D., (AAR-500) also served well in his detailed explanation of the statistical portion of TIP with the performance parameters.

Technical Support Working Group (TSWG) White Paper Review: On September 17, Polly Gongwer, Ph.D., (AAR-520) of the Trace Program attended the white paper review meeting in Crystal City for the TSWG Explosives Detection subgroup. TSWG task managers will request full proposals for Standoff Detection, Cargo Screening, and Explosives/Hazardous Liquid Detection.

Infrared Spectroscopic Detector for Explosive Vapors: From September 16 through September 20, Polly Gongwer, Ph.D., and Richard Lareau, Ph.D., (AAR-520) hosted representatives from Picarro, Incorporated, at the TSL. Picarro delivered and set up a Cavity Ringdown Infrared Spectroscopy laboratory system, developed in conjunction with Massachusetts Institute of Technology under FAA Cooperative Research Agreement 00-G-021. Preliminary testing performed demonstrated detection abilities for explosives. Additional detection experiments will be conducted to establish system limits of detection and possible interferences.

Law Enforcement and Corrections Technology Advisory Council (LECTAC) Meeting: On September 23 and 24, Wagih Makky, Ph.D. (AAR-530) attended the LECTAC annual meeting held in Fairfax County, VA, as a member of the subcommittee on contraband and detection. The meeting featured presentations by law enforcement officers from around the country on their utilization of technology in law enforcement. It also featured talks by Brian Coleman from the UK and Paul McNulty, U.S. Attorney, Eastern District of Virginia, on counter-terrorism in both the U.S. and the UK. Directors of the Department of Justice Office of Science and Technology Divisions and directors of the various law enforcement and corrections technology centers gave brief presentations on the mission of their divisions and centers.

American Society for Industrial Security (ASIS) International 48th Annual Seminar and Exhibits: The ASIS International 48th Annual Seminar and Exhibits was held at the Pennsylvania Convention Center in Philadelphia from September 10 through September 13. ASIS provided AAR-510 personnel, who attended the educational sessions and exhibits, with comprehensive resources for information, technologies, and networking opportunities in the security industry. A broad range of security topics relevant to work done at the Transportation Security Laboratory were introduced, including access control, video surveillance, perimeter security, communications, command and control, and biometrics, providing a forum to discuss the latest strategies, ideas, and best practices in these areas. More than 650 exhibits provided insight into the latest products and technologies available to meet the challenges of transportation security.

Film Exposure Testing: Roy Mason (AAR-510) of the Technology Transition Program assisted representatives from manufacturers of photographic film and magnetic media in conducting x-ray exposure testing. Various types and speeds of film were exposed to different numbers of passes through both checked baggage and carry-on screening systems. The purpose of this test is to try to quantify for the Transportation Security Administration (TSA) how much x-ray dosage various types of film can withstand without incurring visible damage.

Upgrade of Explosives Detection Device: Representatives from Yxlon International X-ray GmbH, Hamburg, Germany, completed the installation of hardware and software upgrades to the XES3000 x-ray diffraction-based explosives detection baggage scanner. The upgrades will allow the TSA to optically select regions of interest for scanning and provide a customized graphical user interface for developmental evaluations. Data collection and developmental testing will occur shortly. The company is also proceeding with preparations for certification testing to take place hopefully by January 2003.